

## Visual Sample Plan (VSP): Helping Reduce Cost and Time While Ensuring Confident Decisions



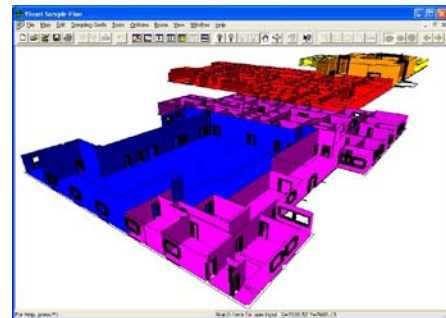
VSP is a software tool developed by PNNL, initially conceived and sponsored through DOE-Office of Health, Safety and Security (HHS), that supports the development of a defensible sampling plan and statistical data analysis to support confident decision making. DOE is now able to leverage off VSP methods and tools sponsored by DHS, EPA, DoD, CDC, and United Kingdom. VSP couples site, building, and sample location visualization capabilities with optimal sampling design and statistical analysis strategies. VSP is currently focused on design and statistical analysis for the following applications.



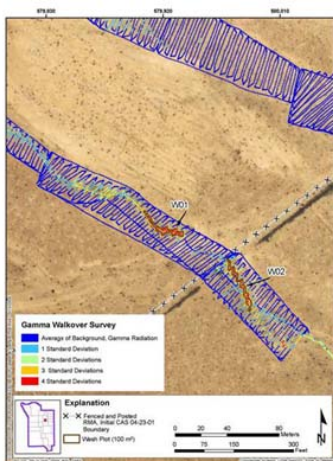
- Environmental Characterization and Remediation
- Environmental Monitoring and Stewardship
- Response and Recovery of Chemical/Biological/Radiation Terrorist Event
- Footprint Reduction and Remediation of Unexploded Ordnance (UXO) Sites
- Sampling of Soils, Buildings, Groundwater, Sediment, Surface Water, Subsurface Layers.

VSP is being used at all major DOE sites. Four applications that are representative of VSP's use and value were recently presented at the annual DOE-HSS Analytical Services Program workshop in Jackson, WY on September 17, 2009.

A **Los Alamos National Laboratory (LANL)** legacy beryllium machine shop in operation from the early 1950s to 1999 is undergoing decontamination. VSP was used to develop a statistically valid sampling strategy that will ensure with 95percent confidence that 95 percent of all surfaces in the shop area are less than the beryllium free release limit. Without VSP, a purely judgment sampling approach would have been used and five times as many swipe samples would have been collected. By using VSP a **\$24,000 cost savings** and an **80% time reduction** were achieved. The LANL Beryllium Program plans to use VSP on all future projects that consist of a beryllium area being converted into a non-beryllium area. – Tony Martinez



At the **Portsmouth/Paducah Project Office**, VSP is used in Project Planning, Data Quality Objectives (DQOs) development, and Sampling Plan (SAP) Development. VSP has been used on numerous Paducah and Portsmouth sites including ditches, soil piles, facilities, and burial grounds. The use of VSP has led to a **more structured approach** to sample plan development, allowed the contractor to develop **defendable sampling plans** prior to regulator meetings, and, generally, **improved communications** between DOE and the regulators. It is estimated that approximately two meetings (i.e., 16 hours of meeting time) are saved per project through use of VSP. – Richard Bonczek



At a **Canadian former refinery site**, VSP was used to develop a probability based grid sampling plan to determine remedial excavation requirements with a confidence level of 90%, using prior knowledge of the frequency distribution of lead soil impacts. VSP was used to optimize the first and second phase of sampling in order to achieve a defensible balance between cost and acceptable risk. The sampling and remediation cost without the use of VSP would have been \$1.75M but by utilizing VSP to derive an **optimal sampling approach** the actual cost was \$0.63M, a **64% reduction** in cost. – Anne Vickers

At the **Nevada Test Site** intensive restoration efforts were launched for several industrial and soils sites. Initially biased judgment sampling was used but in 2005 VSP probabilistic sampling approaches were developed for large land areas suspect of radiological contamination. The new VSP multiple increment sampling approach was deployed to **ensure representative samples** and to minimize analytical costs. **Analytical burdens were reduced** while maintaining contamination detection capabilities. – Thomas Murarik

Visual Sample Plan Website: <http://vsp.pnl.gov/>